CLAIMS

1. A refractive element (10, 20), suitable for refracting x-rays, comprising a body of low-Z material having a first end adapted to receive rays emitted from a ray source and a second end from which the rays received at the first end emerge, characterised in
that said refractive element comprises columns of stacked substantially identical prisms (21).

2. The element of claim 1, wherein said prisms are produced by removal of material corresponding to a multiple of a phase-shift length ($L_{2\pi}$) of a multiple of 2π.

3. The element according to any of preceding claims, wherein an intensity transmission of the element is

$$T(y) = \exp(-X(y)/l) = \exp(-k|y|l)$$

wherein X(y) is the total path length for a ray through the element, l is an attenuation length, k is constant and y is the distance to the optical axis.

4. The element according to any of preceding claims, wherein an effective aperture is defined by:

$$D = \frac{8\delta^2 lF}{\lambda \tan\theta}$$

wherein *F* is the focal length, δ is the decrement of a real part of an index of refraction, *l* is an attenuation length and Θ is the side angle of the prisms.

5. The element according to any of preceding claims, wherein an aperture increase factor (AIF) is defined by:

$$\mathrm{AIF} = 3.2 \cdot \frac{\sigma_{\mathrm{abs}}}{L_{2\pi} \tan\theta}$$

wherein σ_{abs} is root-mean-square width of Multi-Prism Lens (MPL) aperture, $L_{2\pi}$ is 2π-shift length, and Θ is the side angle of the prisms.

6. The element according to any of preceding claims, comprising of one or several of Silicon or diamond.

7. The element according to any of preceding claims, wherein a focal length is controlled by a deviation length (y_g) of one end of the element with respect to the incident ray.

8. A lens (30), suitable for x-rays, comprising a body with low-Z material having a first end adapted to receive rays emitted from a ray source and a second end from which the rays received at the first end are refracted,
characterised in
that said lens comprises two portions, each portion comprising columns of stacked substantially identical prisms (21), said portions being arranged in an angel relative each other.

9. The lens of claim 8, wherein said prisms are produced by removal of material corresponding to a multiple of a phase-shift length (L_{2n}) of a multiple of 2n.

10. The lens of claim 8, wherein said columns are displaced relative each other.

11. The lens of claim 10, wherein said columns are rotated relative each other.

12. The lens of claim 10, wherein said columns are arranged in series.

13. An x-ray apparatus (86) comprising at least an x-ray source (87) and a detector assembly (88), further comprising a refractive element according to any of claims 1-7.

14. An x-ray apparatus (86) comprising at least one x-ray source (87) and a detector assembly (88), further comprising a lens (30) according to any of claims 8 to 12.

15. A method for fabricating an element according to any of claims 1-7, the method comprising: providing an element comprising prism-patterns and removing parts said element to provide prisms to be assembled to a said element.

16. The method of claim 15, wherein said prism patterns are provided by lithographic patterning.

17. The method of claim 15, wherein said removal is achieved by a subsequent deep-etching in silicon.

18. The method of claim 15, further comprising using said element as moulds for chemical vapor deposition of diamond.

19. A method for reducing absorption in multi-prism lens, the method comprising removing material only resulting in a phase-shift of a multiple of 2π.